

explored. There are even questions, especially from the policy makers of the federal funding agencies, whether studies of this sort of cellular activities are essential for biomedical research, or in the mainstream of the modern biological sciences. However, a conference that could attract several hundred attendees must reflect considerable interest in this topic in the scientific community. This volume gives readers a glimpse of an emerging area of interdisciplinary research. Readers who are looking for a more in-depth understanding of EMF effects on biosystem or mechanistic information will find the short report format of the book unsatisfactory. These short papers also defy

judgment on the reliability of data and the credibility of experiments because the details of these experiments cannot be presented in a two-page report. However, most abstracts give references to which readers can refer. This volume will not help a student gain knowledge in the field because a student is more likely to be overwhelmed by the vast knowledge that is required to understand these experiments and be confused by the broadness of the field. However, the volume should be a useful reference for investigators who wish to update their knowledge or to find names and references in biological electromagnetics for otherwise difficult to find information.

***Cell Biological Applications of Confocal Microscopy*, edited by Brian Matsumoto**

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For the past several years, the *Handbook of Biological Confocal Microscopy* (edited by James B. Pawley, Plenum Press, 1990) has been the resource of choice for investigators seeking information on techniques and methodologies for biological confocal microscopy. Unfortunately, rapid changes in the capabilities of commercially available instrumentation, and the availability of a wide variety of new fluorescent dyes, have made many of the practical details in the volume less relevant for new microscopists. "Cell Biological Applications of Confocal Microscopy," the latest volume in the fine *Methods in Cell Biology* series, seeks to fill this void by presenting in one volume a variety of contributions targeted specifically to researchers who seek to quickly become proficient at confocal microscopy.

The first half of the volume focuses on the more technical aspects of biological confocal microscopy, including introductory chapters on confocal microscopy, video rate confocal microscopy, sample preparation techniques for three-dimensional imaging, and labeling techniques for multicolored immunofluorescence confocal microscopy. Of particular note are the chapters contributed by L. Majlof and P.-O. Forsgren of Molecular Dynamics, and Wright et al. of the University of Wisconsin, which do a superb job detailing the various optical factors that can adversely affect confocal imaging, as well as provide detailed protocols for sample preparation to avoid artifacts during three-dimensional imaging.

However, the bulk of the first part of the book is the 85-page opus by T. Clark Brelje et al. of the University of Min-

nesota on multicolored confocal immunofluorescence microscopy. Although of daunting size, this chapter serves as a wonderful technical reference for a wide variety of fluorophores commonly used for antibody staining. Each fluorophore is briefly described, including discussions on typical applications, advantages, and shortcomings, as well as measured excitation and emission spectra for each dye. Knowledge of these spectra is particularly important when imaging samples that have been double- and triple-labeled, to avoid cross-talk between various detection channels. The chapter by Brelje et al. also includes detailed discussions about laser and filter combinations necessary to image samples double and triple labeled with a variety of common dyes.

Although the first half of the volume serves as an introduction to confocal imaging and sample preparation, the second half focuses more on specific applications of confocal microscopy, with topics ranging from imaging of the development of neuronal projections to imaging of sea urchin embryogenesis and endoplasmic reticulum. Most of the chapters are expanded versions of previously published work, with greatly expanded methods sections. In particular, the chapter by Cornell-Bell et al. of Yale University on membrane glycolipid trafficking in acinar cells includes a very detailed methods section, including details on the design of perfusion chambers for confocal imaging. Given the variety of applications that are included, chances are good that readers will find sample preparation and imaging protocols that are relevant to their work.

Overall, "Cell Biological Applications of Confocal Microscopy" is a first rate resource for investigators interested

in biological confocal imaging. The only obvious shortcomings involve areas that were not covered in the volume. For instance, given the importance of image processing in modern day confocal microscopy, I would have liked to see a chapter devoted to methodologies for image processing and image analysis, with particular emphasis on the types of artifacts that can be introduced by image processing. Also, given the greater sensitivity of confocal microscope to optical and alignment problems, a chapter detailing the causes of various aberrations (and methods for correcting these aberrations) would have been of value to researchers seeking to become quickly proficient with confocal microscopy. Still,

these concerns are relatively minor, because these topics are well covered in the literature.

In summary, "Cell Biological Applications of Confocal Microscopy" is a superb collection of chapters detailing both the technical and applications sides of biological confocal microscopy. Aimed primarily at those less experienced with confocal microscopy, sample preparation and imaging techniques are described in great detail, with emphasis on sources of potential artifacts. An up-to-date and complete reference and tutorial, "Cell Biological Applications of Confocal Microscopy" should be a welcome addition to the library of any researcher interested in biological confocal microscopy.